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# Addison-Wesley SCIENCE TEACHERS' EDITION

## LEVEL 3

## **EXPERIENCE AND RECORD BOOK**

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Designed for use with the ADDISON-WESLEY SCIENCE Student Text

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### TO THE TEACHER:

This Experience and Record Book provides a convenient way for pupils to record their results for most of the Basic Activities.\* Various methods of recording are suggested, depending on the nature of the activities. Many are nonverbal or require very little writing.

In addition to the Basic Activities, there are sections labeled "Going Further." These suggest additional science experiences for students who desire them. Often, the "Going Further" sections are extensions of the Basic Activities; sometimes they are completely new.

In the outside margin of each page of this Teachers' Edition are helpful notes for you, the teacher, in color and for pupils in black. The notes for pupils indicate the materials needed for each activity and suggest where it may be performed most conveniently, according to these symbols.

'Basic Activities are those preceded by a red stop sign in the student text. All are included in this book, except a few that do not require records to be kept.



An arrow  $\Rightarrow$  shows that one or more pages which follow are devoted to the same activity, while the symbol -- indicates that the activity is concluded on this page.

The notes for the teacher (which appear only in the Teachers' Edition) indicate how much time will probably be needed for the activity and a recommended group size.

The optimum size of the group varies from one activity to the next. Among the many factors which determine this are the physical layout of the classroom and the availability of materials. Three general group sizes are suggested:

Small: 2 to 7 pupils

Medium: 8 to 12 pupils

Large: More than 12 pupils

Group size is such a highly variable and personal factor, however, that you should feel free to depart from this recommendation if your situation warrants.

The pupils' books are consumable, allowing you to decide whether to remove the perforated pages or keep them intact.

All answers to questions are given in color, and appear in the Teachers' Edition only. The Experience and Record Book can be used as an aid in evaluating pupil progress with the Basic Activities, but is effective for this purpose only if used in conjunction with the methods of evaluation suggested in the Addison-Wesley Science Teachers' Edition for the text.

This Experience and Record Book is more than just a pad for keeping records. It is designed to encourage your pupils to participate in science activities. It provides additional educational aids. It makes it even easier to become involved. And through such involvement Addison-Wesley Science becomes a truly meaningful program—combining fun with sound science.

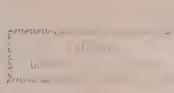
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Illustrations adapted in part from the Addison-Wesley Science student text.

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Basic Activity

6

#### MATERIALS

Cups, paper Flour Leaves or blades of grass Magnifying glasses Microscopes, 10X, 40X (if available) Microscope slides Salt Sand

Soil samples, 3 kinds

# 30 MINUTES SMALL GROUPS

The children will find that soil is not just plain "dirt." Instead, it is an interesting mixture of hard and soft particles, some of them shiny and diamond-like; bits of plant and animal matter; and even some small animals that move about. The particles come in a surprising array of colors, sizes, and shapes.

### MATERIALS (GOING FURTHER)

Soil samples from other places

# 15 MINUTES SMALL GROUPS

single page



# 1 Communities of Living Things

Lesson 1, Page 6

Sun, Water, Soil, and Air

1. Look at the soil samples. Are all of them the same color? \_\_\_\_\_ (yes or no)

2. Put some lawn soil between two microscope slides, as described on page 6 of your text. Slowly rub one slide over the other. What do you hear?

What else do you think might make such a sound? Circle one or more:

GRASS LEAVES FLOUR SALT SAND

Try rubbing some of these substances between glass, and see.

3. With a magnifying glass, do you see more than one kind of material in your soil?

\_\_\_\_\_\_ (yes or no)

Look at the picture on page 6 of your text. Does your soil look something like this? <u>probably yes</u> (yes or no)

In the large circle, make a colored drawing of what your soil sample looks like through a magnifying glass.

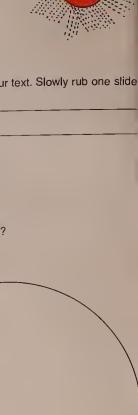
## GOING FURTHER

Bring in samples of soil from other places. Are they different from the sample you observed?

COMMUNITIES OF LIVING THINGS









Sun, Water, Soil, and Air

Are some kinds of soil better than others for growing plants? To find out, do the experiment on pages 8 and 9 of your text. At the end of each week, measure the height of each plant. Write the date next to its height on the measuring stick. Make a drawing of each plant showing how it looks after three weeks.

1. Which cup do you think had the fewest chemicals for the plants to use?

Circle one:



2. In which cup did the seeds grow best? Circle one:



single page

themselves make. One of the

things needed in food making

The plants grow best in the

soils that provide the soil chemicals they need. Most

likely these are the soils in

is soil chemicals.

cups 3 and 4.

STUDENT TEXT

**PAGES** 



14-15

### **MATERIALS**

\*Bags, paper, large
Lawn, samples of, 30 cm
square × 8 cm deep
\*Magnifying glasses
Newspapers
\*Toothpicks or sticks

#### 1 HOUR SMALL GROUPS

\*Trowels or spades
\*Items in Kit

Encourage your students to observe characteristics of unknown specimens. Do not insist that they identify each one.

single page



# Lesson 2, Pages 14-15 A Lawn Community

What can you see in a piece of lawn? To find out, do the activity on pages 14 and 15 of your text. Stand for a while and observe the sample of lawn before you dig it up.

In the space at the right, draw or list the different kinds of living things you can see.

Dig up and divide your piece of lawn as described in your text. In this space list and count the different living things you found.

Now, with your classmates, make a class list of everything that was found. Put this list on the chalkboard or bulletin board where everyone can see it.

Draw or describe any animals you found that you had never seen before.

# Lesson 2, Page 16 A Lawn Community

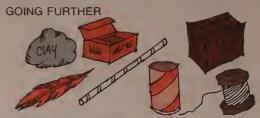
Working with a partner, mark off a square metre of lawn. Take turns dropping and picking up first red and then green toothpicks, as directed on page 16 of your text. Record how long it takes each of you to find the red and the green toothpicks.

	My Pick-up Times	My Partner's Pick-up Times
Red Tooth- picks		
Green Tooth- picks		

From what you observed, which color seems better to help an animal hide in grass?  $\frac{green}{brown}$ Both in grass and on soil?  $\frac{speckled\ green\ and}{speckled\ green\ and}$ 

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Build a pretend animal. Make it from clay, paper, glue, toothpicks, and anything else you can think of. Make it so that its enemies would not be able to find it easily.

Then take the animal outside and place it where it might hide from its enemies. See how long it takes your classmates to discover it.

If your classmates build pretend animals, see which ones are hardest to find. Why are they hardest to find?

Probably because they

look much like their surroundings, or

COMMUNITIES OF LIVING THINGS

background.



16

#### **MATERIALS**

Rulers, metric Sticks, applicator Stopwatches or clocks String Toothpicks, green Toothpicks, red

# 30 MINUTES SMALL GROUPS

Your students should conclude that the color of an animal helps to protect it when its color is similar to that of its background. Some speckled fish are almost invisible when they stay close to the speckled sandy bottom of a stream or lake.

### MATERIALS (GOING FURTHER)

Items for making pretend animals, such as:

Clay

Glue

Paper, construction

Scissors Toothpicks

# 30 MINUTES INDIVIDUAL WORK

single page



7

# STUDENT TEXT

22

#### **MATERIALS**

Clock
Jars, large or tumblers, clear

Refrigerator Thermometers

Water

#### 15 MINUTES ENTIRE CLASS

Students will find that water does not cool as rapidly as air.

### MATERIALS (GOING FURTHER)

Heater or furnace

15 MINUTES ENTIRE CLASS

single page



Lesson 4, Page 22

A Pond Community

Measure the temperature inside each jar, as described on page 22 of your text. Record your findings on the charts below.

Jars at Room Temperature

Temperature inside jar filled with

air:

Temperature inside jar filled with

water: \_\_\_\_\_

Jars after 15 Minutes in a Refrigerator

Temperature inside jar filled with

air:

Temperature inside jar filled with

water:

Which cooled more? Circle one:

WATER



### GOING FURTHER

Place a thermometer in each of two large jars. Fil one jar with water. Let both jars stand until the temperatures inside them are the same.

Now put both jars in a hot, sunny place. Or put both jars near a heater or furnace. Leave them for 15 minutes. Then check each thermometer. In which jar is the temperature lower?

Jars at Room Temperature

Temperature inside jar filled with air:

Temperature inside jar filled with

water: \_\_\_\_\_

Jars after 15 Minutes in a Hot Place

Temperature inside jar filled with air:

Temperature inside jar filled with

water: \_\_\_\_\_

Which cooled more? Circle one:

WATER



# MAKE DRAWINGS AND NOTES IN THIS SPACE.

Lesson 4, Page 26 A Pond Community

Borrow a small sample of a pond, as described on page 26 of your text. Watch the

As you observe these living things from a pond, you can make drawings and notes on this page. Be sure to think about the questions listed in your text at the

living things in your sample through a magnifying glass.

STUDENT TEXT

26

## **MATERIALS**

\*Bowls, white

\*Containers, large, with lids

\*Flashlights

\*Magnifying glasses

"Strainers

\*Items in Kit

### 1 HOUR MEDIUM GROUPS

The questions on page 26 of the student text do not require specific answers; they are intended chiefly to provoke thought and observation.

single pag



end of this activity.

31

#### MATERIALS

Boxes, cardboard Cups, paper Pencils Seeds, radish Soil, garden or potting Soil from a vacant lot Water

# SEVERAL WEEKS SMALL GROUPS

You may expect garden soil lo favor plant growth. However, some vacant lots have excellent soil.

single page



# Lesson 5, Page 31 A Vacant Lot Community

1. Set a cardboard box in a vacant lot, as described on page 31 of your text. In the space below, make a record of the animals in the order they appear in the box. 2. Test some soil from a vacant lot to see how well plants will grow in it. Compare them with plants grown in garden soil. Follow the suggestions on page 31 of your text.

Each week, measure the height of the tallest plant in each group. Make a record of its height by writing the date next to its height on the ruler.

Which plants seem to grow better—those in garden soil, or those in soil from the vacant lot? Circle one:

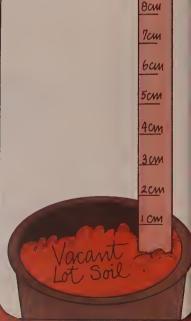
GARDEN SOIL
VACANT LOT SOIL

NO DIFFERENCE

locu

9 cm





# 2 Measurement — A Science Process

Lesson 1, Page 43

**Things That Measure** 

1. Read the activity called "Some Things to Do" on page 43 of your text. Use this page for your piece of paper. With your ruler, draw your line between the two lines drawn here.



of your textbook.



What is the distance? 21 cm

Mark the same distance on the line you drew above.

Measure the length (long side) of your textbook.

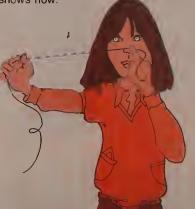


Now measure the width (short side) What is this distance? almost 26 cm

Mark it on the same line.

How much difference is there between the length and width of your about 5 cm book?

2. Hold a piece of string between your nose and right hand. Your text shows how.



Now carefully measure the distance the string is stretched. What is the distance?

Record it on the class chart.

Who of your class has the longest line on the class chart?

How long is the longest line?

Who has the shortest line?

How long is the shortest line?

How much difference is there between the shortest and the longest lines on the chart?

MEASUREMENT-A SCIENCE PROCESS

STUDENT TEXT PAGE

MATERIALS

\*Rulers, metric "String

\*Items in Kit

#### 30 MINUTES INDIVIDUAL WORK

If students are unsure of how to measure distance with a ruler, review the procedure with them. Be sure that the left edge of the ruler's scale should line up with the left edge of the distance they are measuring.

A student should measure from the same point each time he or she records a distance on the line drawn in the first ac-

Draw a chart on the chalkboard on which the students can record their measurements in part 2.



46

#### MATERIALS

None

10 MINUTES
INDIVIDUAL WORK

In this activity, students relate the 1-cm length to familiar objects.

### MATERIALS (GOING FURTHER)

Collection of items listed in activity

15 MINUTES INDIVIDUAL WORK

single page



# Lesson 2, Page 46 Units Used to Measure Distance

What things can you think of that are about 1 cm long or wide? List them in the space below. Draw a sketch of each one. Try to make each sketch the same size as the object.

## GOING FURTHER

Collect as many of the things you listed as you can. Measure each distance you thought was about 1 cm. Is the distance 1 cm, longer than 1 cm, or shorter than 1 cm? Make a record of each distance under the heading that best describes it.

1 cm	Longerthan 1cm	Shorter than I cm

# esson 2, Page 47 Inits Used to Measure Distance

fake a circle with a handle, as described n page 47 of your text. With it mark off a stance of 10 m on the playground. How

nany turns of your wheel is this?  $\underline{100}$ 

Time some of your classmates as they un 100 m. Keep a record of their times on he chart below. Ask them to time you. Record your time on the chart, too.

, D <sub>10</sub>	
Names	Times
9	

Lesson 2, Page 48
Units Used to Measure Distance

Here is something to try before you start the activity on page 48 of your text.

Measure the width of the box around the student text page. First, mark off its width on a piece of paper. Then, use the ruler on this page to measure that distance in millimetres. How wide is the box? 25 mm Be sure to write mm after the number in your answer. It means "millimetres."

Now, do the "Something to Try" in your text. Record each measurement on the chart below. Find two or three more things whose width you can measure in millimetres. List them on the chart. Record their widths.

1160-05	100	-
My smallest fingernail		
My pencil		
Space between lines on paper		

STUDENT TEXT

47

### MATERIALS

\*Cardboard, corrugated, 32 cm x 32 cm \*Cardboard, corrugated, 3 cm x 50 cm

Chalk

\*Fasteners, brass

\*Metre sticks

Pencils

\*Pins, straight

\*Rulers, metric

Scissors

Stopwatches or watches with second hands

\*Straws, plastic

Straws, plastic

\*Tape, masking

\*Items in Kit

STUDENT TEXT

48

#### **MATERIALS**

Objects, small Paper, ruled Pencils



49

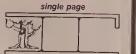
### MATERIALS

None

#### 40 MINUTES ENTIRE CLASS

Plan a 1-km walk for the class. You can measure the 1-km distance in advance with an automobile odometer. Remember that a kilometre is about 0.6 miles.

If there are 12 blocks in a mile where the school is located, 1 km is about 7½ blocks. If there are eight blocks in a mile, 1 km is about five blocks.



Lesson 2, Page 49
Units Used to Measure Distance

Take a 1-km walk. In that kilometre,

• how many blocks did you walk? \_



# Lesson 3, Page 52 How Well Can You Measure?

Work with a classmate. Take turns measuring each other with a tape measure. Record your measurements in the left column on the chart below. Record the date at the top of the column.

Date:	Date:	
1.height		
2.head size	cm	Cm
3. chest (full)		
4. Chest (empty)	cm	cm
5.waist	cm	cm

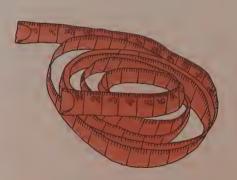
Predict what you will measure three months from today. Make a record of your predictions on the chart below.

1. predicted height	
2. predicted head size	
3. predicted chest (full)	
4. predicted chest ("empty")	
5. predicted waist	

Working with your classmate, take turns measuring each other three months later. Record your measurement in the second column on the first chart. Record the date at the top of the column.

Compare your height with your predicted height. Was your prediction correct? \_\_\_\_\_ (yes or no)

Could you have found out without measuring? \_\_\_\_ (yes or no) Give the reason for your answer. \_\_\_\_\_



STUDENT TEXT PAGE

52

### MATERIALS

\*Tape measures, metric

\*Items in Kit

# 30 MINUTES SMALL GROUPS

Before starting the measurements, have the class decide between variants, such as measure height with shoes on or off and measure waist when breathing or holding breath.

Demonstrate how to measure a student's height, as described in the second column on page 52 of the Teachers' Edition.

Tell the students that each one should take a deep breath and hold it for a full chest, but breathe out and hold it for an empty chest.



STUDENT TEXT

57

#### **MATERIALS**

Balance, equal-arm
Container, 1-L capacity
Mass, 1-kg
Masses, small (nails or
thumbtacks)
Pebbles or soil

#### 30 MINUTES ENTIRE CLASS

Sand

If you do not have a measuring container, as shown in the picture in the student text, you can use a plastic or glass jar with a capacity of 1 L or more. Run a piece of masking tape straight down the side of the jar. Record the level of 1 kg of each material on the tape.

Single page

Lesson 4, Page 57
Units Used to Measure Mass

Find out how much space 1 kg of sand takes up. Use a measuring container. Follow the instructions on page 57 of your text.

Find out how much space 1 kg of pebbles (or soil) takes up. Which takes up less space—1 kg of sand or

1 kg of pebbles? \_\_\_\_\_ 1 kg of sand

Which of these do you think would take up the least space—1 kg of dry

soil?
marbles?
foil?
pebbles?
nails?
fish sinkers?

How could you tell? Measure out 1 kg of each material and see which takes up the least space. 

## Lesson 4, Page 59

### Units Used to Measure Mass

Collect some common small objects. Then find the mass of each in grams. What are some objects that have a mass of about 1 g? 2 g? 5 g? 10 g? 100 g? Make a record of these objects on the chart below.

Mass	OL west 1
About 1g	1-1-1-1
About 2g	
About 5g	
About 10g	
About 100g	170-000

One thumbtack has a mass of less than 1 g. And so does one pin, one toothpick, and one staple. Find out how many of each object it takes to equal 1 g. Record the number on the chart below.

Te,esti	How -
Thumbtacks	
Pins	1
Toothpicks	
Staples	-

### GOING FURTHER

Measure the mass of a box of crayons. Record the mass on the chart. Measure and record the mass of several other objects, too.

Objects	Mass
Box of crayons	

STUDENT TEXT PAGE

59

### MATERIALS

Balance, equal-arm
\*Mass, 100-g
\*Masses, 1-g (plastic cubes)
Objects, small, assorted
\*Pins, straight

Staples

\*Thumbtacks \*Toothpicks

\*Items in Kit

# 30 MINUTES ENTIRE CLASS

The students' results may vary from those given if the items they used differed in size from those the author used.

### MATERIALS (GOING FURTHER)

Crayons
Objects, additional

10 MINUTES ENTIRE CLASS



### MATERIALS

Crayons or pencils

\*Cups, paper

\*Nails, large

Paper clips

Paper strips, 28 cm × 6 cm

Rubber bands

\*Thumbtacks

\*Items in Kit

#### 30 MINUTES SMALL GROUPS

Each mark on the paper must mark the addition of exactly the same standard unit. Theoretically, the distance between each two consecutive marks will be the same.

single page

Bugger





Lesson 5, Page 60 Scales and Balances

Use rubber bands to make a scale like the one shown on page 60 of your text.

Use large nails or large bolts as standards. Each one must have the same mass. In the space below, draw a picture of the standard you plan to use.



Tack the paper strip to the bulletin board. Tack your scale to the bulletin board, too. Tack it with the cup below the top of the paper strip. As shown in the left picture on page 60, make the zero mark on the paper strip.

Add standards to the cup one at a time. Each time you add a standard, mark where the top of the cup comes.

Use your scale to find the mass of several different objects. Make a record of each object and its mass on the chart.

Objects	Mass in Standards

# 3 Motion and Location

Lesson 1, Page 70
Things That Move

With three of your classmates, play the game described on page 70 of your text. On the score sheet below, keep a record of how well each player does.

When a player guesses the right object, write the letter R in a box in the top row. When a player

guesses a wrong answer, write the letter W in a box in the bottom row.

At the end of the game, find each player's score. The player with the largest number of Rs wins the game. If no one has any Rs, the player with the smallest number of Ws wins.

SCORE SHEET

Names		F	Reco	rd	o <sup>c</sup> I	lay	5				
Player 1	R										
	W										
Player 2	R										
	W										
Player 3	R										
	W										
Payer 4	R										
	W										

Winner:\_\_\_\_

STUDENT TEXT PAGE

70

MATERIALS

Objects, small, assorted

30 MINUTES
SMALL GROUPS

Make sure the children realize that they can compare their scores at the end of the game only if each player has been "it" the same number of times.



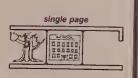
76

### MATERIALS (GOING FURTHER)

Balls, rubber, small (optional) Paper, drawing Trampoline (optional)

# 40 MINUTES INDIVIDUAL WORK

This activity encourages the child to use symbols as a means of communication. It also provides the opportunity to integrate science with physical education. Many of the concepts of position and location can be dramatically presented during the physical education class.





Lesson 3, Page 76
Kinds of Motion

## GOING FURTHER

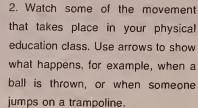
1. Draw a straight arrow beside each object which is moving from one place to another.



Draw a curved arrow beside each object which is turning.



Draw both a straight arrow and a curved arrow beside each object which is moving from one place to another and turning at the same time.









or

Kinds of Motion

The ball has two possible motions in the activity on page 78 of your text. It has a straight up and down motion (\$\frac{1}{2}\$). It also has an upside down U-shaped motion (\$\frac{1}{2}\$). As you do the activity, draw the correct arrow in each box.

1. When you are standing still:

What does the motion of the ball look like to you?

What does its motion look like to an observer who is also standing still?

1



2. While you are walking:



What does the motion of the ball look like to you?

What does its motion look like to an observer who is standing still?

What does its motion look like to an observer who is walking with you?







3. When you stop walking as soon as you throw the ball straight up:



What does the motion of the ball look like to you?

What does its motion look like to an observer who is standing still?

What does its motion look like to an observer who keeps on walking?













STUDENT TEXT

78

#### MATERIALS

Balls, rubber, small

#### 30 MINUTES ENTIRE CLASS

This activity provides further practice in the use of symbols as a means of communication.

It is likely that students will disagree with some answers and will ask to see the same motion repeated several times. Some may be unsure of what they see.

Again, we recommend that you consider integrating science with physical education.



\_\_\_\_

MATERIALS

None

30 MINUTES
INDIVIDUAL WORK AND
SMALL GROUPS

A more complex code can be developed by having students make variations of the original grid, and numbering each grid. Then each coded letter could be represented by 3 numbers. For example, (2, 6, 5) would mean:

grid #2 vertical column #6 horizontal row #5

sing	le	pag	e

	HIBBER HIBBER HIBBER	
<u> </u>		

Lesson 4, Page 81
Location and Grids

Try the activity at the bottom of page 81 of your text. What is the answer to the riddle "What gets wet as it dries?"

TOWEL

Using the chart, write your full name in numbers.

Now pass this page to a classmate and have him or her write a secret message to you here.

Name of classmate:

6 A F
4 J K
3 O P
2 S

T

X Y

Figure out your classmate's message here. \_

MOTION AND LOCATION

# Lesson 4, Page 82 Location and Grids

### **GOING FURTHER**

About the same time each day, Karen, Gary, and Tom take their dogs for a walk. Trace each child's path on the map with a crayon of a different color.

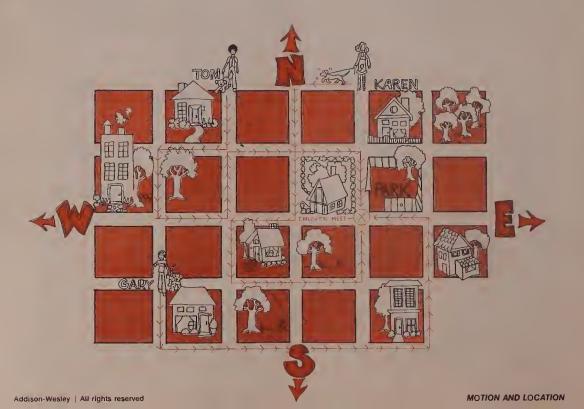
Karen and her dog walk 1 block west, 2 blocks south, 1 block west, 1 block south, 2 blocks east, and 1 block north.

Gary and his dog walk 1 block south, 4 blocks east, 2 blocks north, and 1 block west.

Tom and his dog walk 1 block south, 1 block west, 1 block south, 1 block east, 1 block north, 2 blocks east, and 1 block south.

Where do the children and their dogs meet?

at the park



STUDENT TEXT PAGE

82

### MATERIALS (GOING FURTHER)

Crayons, three different colors

#### 20 MINUTES INDIVIDUAL WORK

This page gives the children more practice working with a grid. To follow the paths taken by each child, suggest that they put one finger at the starting point and move it along the route to see how many blocks the finger moves and in which directions.



# STUDENT TEXT

91

### **MATERIALS**

- \*Bags, plastic, food
- \*Clay, modeling
- "Metre sticks
- Newspapers
- \*String
- Tagboard, about
  - 30 cm × 45 cm
- \*Tape, masking
- \*Items in Kit

# 45 MINUTES SMALL GROUPS

The purpose of these activities is to help the children observe the effect of air on moving objects.

### single page



# 4 Air—An Invisible Push

Lesson 1, Page 91
Air in the Way

- 1. Do the first activity on page 91 of your text. How far did you throw the piece of newspaper—

  - when it was squeezed into a ball?

The piece of newspaper has more air to push out of its way when it is flat than when it is squeezed into

a ball. And so it does not go so far when it is flat.



Hold a piece of tagboard straight up and down. Hold it as described in the second activity on page 91. Then drop it. What sound does it make? \_\_a fairly loud sound

Now hold the tagboard flat. Drop it. How does this sound compare with the first sound?

This sound is softer than the first sound.

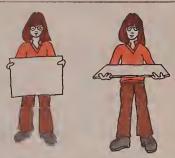
Did the tagboard fall faster when you held it the first the second way? \_\_\_\_\_\_ Explain the second way? \_\_\_\_\_ Explain your answer. \_\_\_\_\_ It had less air to push out of its with when I held it the first way.

What was between the tagboard and the floor?

aii

What happened when the tagboard fell?

The tagboard had to push the air out of its way



3. What should you do in the third activity on page 91 throw the parachute up high? Wrap the plastic tight ly around the clay without tangling the strings.

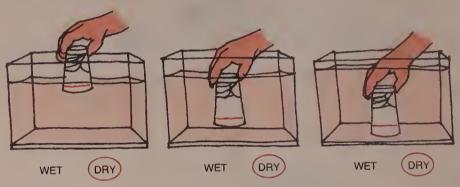
it goes up? \_\_\_\_\_ The parachute opens on the way down. More air gets in its way when the parachute is open than when it is closed.

## esson 2, Page 92

### Air Takes Up Space

. Do the first activity on page 92 of your text. As you press the tumbler down into the water, observe the water level in he tumbler.

On each drawing, add a line to show the water level in the tumbler. Observe the tissue, too. Circle the word that describes the tissue when the tumbler is at the depth shown in each drawing.



How would you explain what you observed? \_air in the tumbler kept the water out.

The tissue stayed dry because

2. Do the first part of the second activity, as described on page 92 of your text. What did your partner feel? \_\_\_\_\_\_\_ air escaping from the funnel

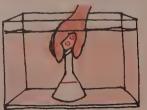
Notice the arrow on the container in the first drawing. It shows where the water level was before you removed your thumb. Add a line on the container and one on the funnel to show the water levels now. How would you explain what you observed?

As air escapes from the funnel, water takes its place. And so the water

level drops in the container and rises in the funnel.

Do the second part of the second activity, as described on page 92. On the second drawing show what happens.





STUDENT TEXT
PAGE

92



\*Container, large or aquarium \*Funnel, clear

Pen, felt-tip Tissue

\*Tumbler, clear

Water

\*Items in Kit

20 MINUTES ENTIRE CLASS

Ask a student to demonstrate the first activity for the class. Give each child an opportunity to feel the tissue at the end of the demonstration. Ask two other students to demonstrate the second activity. Let all the students watch the water levels in the conteiner and the funnel.



# STUDENT TEXT

96

### MATERIALS

\*Bags, plastic, large, with twists

\*Items in Kit

# 15 MINUTES SMALL GROUPS

SAFETY NOTE: Do not let children run and jump on the bags of air. Too much weight on a bag will force the air into such a small space that its pressure might cause the bag to burst. Sitting on the bag, however, is harmless. If a fingernail should puncture a bag, the child would settle to the floor.

It is possible to press in on the bag while someone is sitting on it. This means the pressure in the bag is low. The pressure is the force, the push of the air in the bag, on a unit area—often one square centimetre—of the bag.

SI	ng	le	pa	g	е
	_	_		_	=



Lesson 3, Page 96

## Air Can Push on Things

Perform the activity on page 96 of your text and answer the following questions:

- What size bag did you use? \_\_\_\_\_\_
- Can your partner sit on the bag while you hold the air in it? \_\_\_\_\_\_\_ (yes or no)
- If so, how long can your partner sit on the bag?

Circle one: LESS THAN 1 MINUTE

1 MINUTE TO 2 MINUTES

MORE THAN 2 MINUTES

- Can you easily press in on the bag while your partner is sitting on it?

  yes
  (yes or no)
- If you can, is the pressure in the bag high or low?
   Circle one: HIGH LOW
- Is it hard to hold the opening together? <u>no</u> (yes or no)

Draw arrows to show how the air inside the plastic bag is pushing on the bag.





# Lesson 3, Page 97 Air Can Push on Things

Read the activity on page 97 of your text. Predict what will happen when each one blows into a plastic bag at the same time.

With the help of 12 to 15 classmates, your teacher, and another adult, set up the activity. You and each of your classmates should get ready to blow into a bag.

At a signal from your teacher, everyone should blow.

What happens? \_\_\_\_ The top table and the teacher

sitting on it move up.

How would you explain what happens?

The air in each bag pushes up on the table. Many small pushes have the effect of one large push.

Check what you predicted. Was it correct? \_\_\_\_\_ (yes or no)

Suppose the tables were so large that everyone in school could have a bag to blow into. How much do you think all of you could lift?

STUDENT TEXT PAGE

97

#### MATERIALS

\*Bags, plastic, lood
Tables, about 1 m × 3 m
\*Items in Kit

# 30 MINUTES ENTIRE CLASS

Il possible, use tables with folding legs. This kind of table is easier to overtum on top of the bags than one with fixed legs. Ask a custodian to help you.

Make sure most of each bag is between the tables, or it will slip out when it is inflated.



99

## **MATERIALS**

Cars, toy (optional)

\*Clay, modeling

\*Corks, or 1-hole stoppers

\*Mailing tubes, telescoping, with hole for cork or stopper Scissors

\*Straws, plastic

\*Items in Kit

# 40 MINUTES MEDIUM GROUPS

If you need to make a hole in the mailing tube, start it with a bit and brace; use a cork borer or hand drill to make the hole in the cork. If the straw or cork is loose, tighten it with modeling clay.

MATERIALS (GOING FURTHER)

None

45 MINUTES ENTIRE CLASS

single page		
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Lesson 4, Page 99
Putting Air to Work

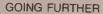
Make the carlift, as described on page 99 of your text.

Describe how the carlift works.

Compressed air pushes up the lid of the mailing tube.

Is air leaking any place? \_\_\_\_\_ (yes or no)

Draw arrows on the picture at the right to show how the air inside the mailing tube is pushing on the tube.



Visit a service station. Ask the operator to show you how some of the compressed-air tools work. On the chart, record each tool and its use.

Compressed-artool	What it is used for

In this space, record other things you learned
on your trip.

# 5 Bones and Muscles

Lesson 1, Page 108

**Bones Protect and Support the Body** 

Feel the bones in one of your legs, as described on page 108 of your text. Which is the larger bone, the shinbone or the calfbone? <a href="https://example.com/theshinbone">the shinbone</a>

On the drawing of the bones of the leg below, label the shinbone and the calfbone. Label the upper leg bone, too.

-Upper leg bone

Shinbone

Addison-Wesley | All rights reserved

Lesson 1, Page 109

Bones Protect and Support the Body

Feel the bones in your arms, as described on page 109 in the text.

How are your arm bones like your leg bones?

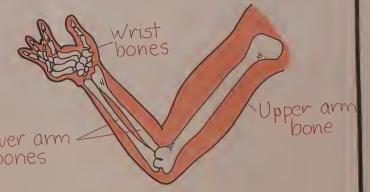
Each arm and leg have an upper bone and two

lower ones.

How are your arm bones different from your leg bones? My arm bones are smaller and lighter

than my leg bones.

On the drawing of the bones of the arm below, label the upper arm bone, the lower arm bones, and the wrist bones.



STUDENT TEXT PAGE

108

#### **MATERIALS**

None

# 10 MINUTES INDIVIDUAL WORK

Have the students write the labels parallel to the top and the bottom of the page. Instruct them to draw a straight line from each label to the bone.

STUDENT TEXT PAGE

109



None

### 10 MINUTES INDIVIDUAL WORK

When a label includes two bones, have the students draw a line from the label to each bone. In the case of the wrist bones, have them use a bracket beside the eight wrist bones. Then have them draw a line from the bracket to the label.



111

MATERIALS

Crackers

30 MINUTES

It is not hard to identify most of the obvious joints of the body once the two kinds of movement have been carefully observed.

The fingers (and toes) provide an interesting combination of both ball and socket and hinge joints.

MATERIALS (GOING FURTHER)

None

10 MINUTES INDIVIDUAL WORK

single page



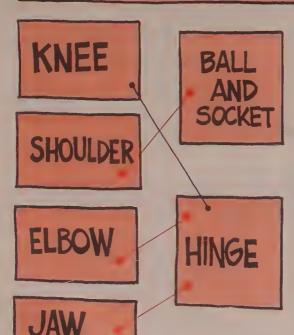
Lesson 2, Page 111

**Bones and How They Move** 

Try all the movements suggested on page 111 of your text. Then draw a line between each joint listed below and the kind of joint it is.

**JOINTS** 

HINGE OR BALL AND SOCKET



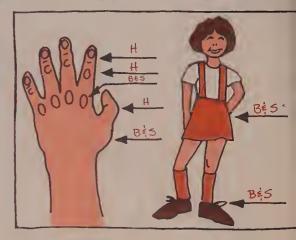
Circle the part(s) of the jaw that will move when this boy chews the cracker.

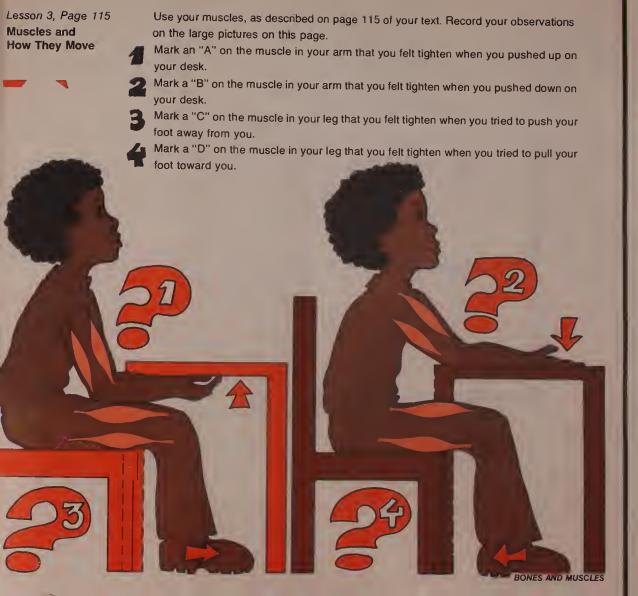


### GOING FURTHER

Test some other joints in your body.

The arrows in the drawing below point to some joints. Label each joint H (hinge) or B & S (ball and socket).







None

#### 15 MINUTES INDIVIDUAL WORK

Muscles cannot expand by themselves. They can only contract (tighten).

The muscle opposite the contracting muscle is relaxing.





116

#### MATERIALS

Pencils String, 30-cm lengths

# 30 MINUTES SMALL GROUPS

Pulling downward on strings not being used to write the letter will help to keep the pencil upright and pressed against the paper.

Skill will definitely improve with practice. The children should become aware of the unique ability of their fingers.

When you write, the fingers whose muscles do the pulling are the thumb and the next two fingers (index and middle fingers).

single page

Lesson 3, Page 116 **Muscles and How They Move** Tie the strings to a pencil as shown. Try to do the activity on page 116 of your text. You may find it easier to start by tracing a letter. So, begin by tracing the giant "E" below wi the help of three of your classmates. Now, make another letter with the help of your three classmates in this space. Try it again with a different letter in each of your three classmates' Record Books.

How must you pull on the strings to press the pencil against the paper?

down (up or down)

Does the pencil remain upright if someone lets go of one of the strings?

no (yes or no)

Mark an "X" on the fingers whose muscles do the most pulling when you write.





## Lesson 3, Page 117

## Muscles and How They Move

1. How hard can you push with one foot? How hard can your partner push with one foot? Do the first activity on page 117 to find out. Record your findings on the chart below.

Which muscles are helping you push?
he front muscle of the upper leg and the back muscle of the lower leg
When you push with your foot, are your muscles pushing, too? (yes or no)
With which foot did you push harder?
Which one of you pushed harder with the left foot?
he right foot?

Name	Foot	Amount of push
	Left	
	Right	
	Left	
	Right	

2. Hand wrestle with a classmate, as described in the second activity on page 117. Fill in a line on the chart each time you hand wrestle.

Which muscles contract when you hand wrestle? \_\_\_\_\_shoulder muscles

Myname	'	10006	- weel
	VS.		
	VS.		
	VS,		

STUDENT TEXT PAGE

117

#### **MATERIALS**

Bathroom scales

# 30 MINUTES SMALL GROUPS

Each student rests one elbow on the table, grasps the hand of the other person, and waits for the starting signal. When an outside person says, "Start," each wrestler tries to force the other person's hand over sideways until it touches the table.

Here are some rules for the game:

- Both persons must remain seated at all times.
- A player is not allowed to hold or push against the table or chair with the free hand.
- A player is not allowed to squeeze or try to hurt the other player's hand.

BEARD BRANSS	

#### MATERIALS

Watches or clocks with second hands Water

# 30 MINUTES INDIVIDUAL WORK

On the chart, have the children record their pulses while sitting quietly and when they have been breathing faster than usual. Their pulses will be higher in the later case.





MY PULSE

MY CLASSMATE'S PULSE

LOWEST PULSE IN THE CLASS

HIGHEST PULSE IN THE CLASS

Lesson 3, Page 119
Muscles and How They Move

1. Find your pulse, as described on page 119 in your text. Count the pulses in one minute while sitting quietly.

Write your name in the first column on the chart. Record the number of pulses per minute in the second column.

Find a classmate's pulse. Count the pulses per minute. Make a record on the second line of the chart.

NAMES	E NE Quiet y	BREATHING FASTER THAI SUAL

2.	Do '	the second	activity	on	page	119	of	your	text.	Answer	these	questions
----	------	------------	----------	----	------	-----	----	------	-------	--------	-------	-----------

- Are you able to stop breathing for one-half minute? \_\_\_\_\_ (yes or no)
- Can you make yourself breathe faster than usual? \_\_\_\_\_\_ (yes or no)
- Can you control the muscles with which you breathe while you sleep? \_\_\_\_\_\_ ( yes or no)
- ullet How do you know? When I sleep, the muscles with which I breathe are totally involuntary.

3. Take a drink of water. Once you have swallow	ved the water, can you stop it from passing into your stomach?
( yes or no) Explain your answer	The muscles that move the water to my stomach must
be involuntary ones.	

119

Most students cannot hold their breath for one-half minute the first time they try. However, with practice, any healthy child can learn to hold his or her breath for this length of time.

It is, of course, impossible to stop the process of water passing through the digestive system.

last page

STUDENT TEXT

127

## MATERIALS

\*Ball, rubber, small
\*Block, cubical
\*Flashlight or projector
\*Lid, container
\*Tube, cardboard
Wall, light-colored, or screen,
projector

\*Items in Kit

# 40 MINUTES ENTIRE CLASS

On a sunny day, you can take the students into a patch of sunlight and let them make their shadows on the floor or ground. Otherwise, darken the room and let the children lake turns making shadows in the light of a flashlight or projector.

go on to the next page

# 6 Shadows and Light

Lesson 1, Page 127
Shadows and How They Change

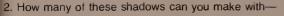
Try the shadow activities on page 127 of your text.

1. How many animal-shaped shadows are you able to

make with your hands?

Draw these shapes in the space below.





- a ball? <u>1</u> a jar lid? <u>2</u>
- a block? 2 a cardboard tube? 4

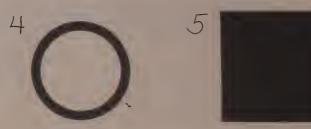


Which shadows(s), can you make with-

- a ball?  $\underline{6}$  a jar lid?  $\underline{6,7}$
- a block?  $\frac{3,5}{}$  a cardboard tube?  $\frac{1,2,4,7}{}$

Which shadows(s), if any, can you not make with any of the four objects? 8











STUDENT TEXT PAGE

To make shadow 1, point the cardboard tube slightly toward the screen. To make shadow 2, point the cardboard tube more toward the screen than for shadow 1. To make shadow 4, point the cardboard tube directly at the light.

To make shadow 3, hold the block with one corner up and one corner down. To make shadow 5, hold the block with one side facing the light.

To make shadow 7 with a jar lid, hold the lid with its edge toward the screen. To make shadow 7 with a cardboard tube, hold the tube with its length parallel to the screen.

last page

132-133

### **MATERIALS**

\*Bowls or lids, about 10 cm in diameter

\*Cardboard, corrugated, 15 cm x 15 cm

\*Electric light sources from

p. 131 Pencils

\*Pins, straight

\*Rulers, metric

\*Items in Kit

# 30 MINUTES SMALL GROUPS

Two pins cast shadows in nearly the same direction when the light source is far away from the pins on never cross when there is only one light source. However, the two shadows may overlap and appear as one when the pins are in line with the light source.

The shadows of eight pins in a circle fall in nearly the same direction when the light source is lar away. The shadows of all the pins lall outside the circle when the light source is above the inside of the circle. At most, four shadows can fall inside the circle at one time when there is only one light source.

single page		
	Enoo. Enneau Deaneau Engele	

Lesson 2, Pages 132 – 133 Light Sources and Shadows

1. Do part 1 of the activity, as described on page 132 of your text. On the picture below, draw the shortest shadow and the longest shadow the pin casts.



2. Stick a second pin into the cardboard. Get both pins to cast shadows. Do the shadows fall in the same direction or in different directions? Circle one:

IN THE SAME DIRECTION

IN DIFFERENT DIRECTIONS

Can you make the shadows fall in nearly the same direction? yes (yes or no)

Can you make the shadows c.os ? \_\_no\_ (yes or no)

Hold the light source in different places. Can you make the two pins cast one shadow? yes (yes or no)

SHADOWS AND LIGHT

3. Stick eight pins in a circle, as described in part 3  $_{
m 0I}$  page 133 of your text. Make the pins cast shadows.

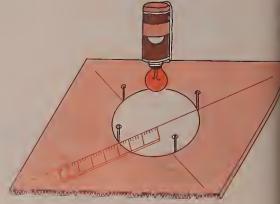
Can you make all the shadows fall outside the circle? yes (yes or no)

How many shadows can you make fall inside the circle at one time?  $\frac{4}{2}$ 

In what direction is each shadow from the light source?

It is on the side of the pin directly away from to light source.

On the picture below, draw the shadows of the four pins. Then lay a ruler along one of the shadows. Draw a line along the ruler from the pin across the circle. Does



esson 2, Pages 132-133 ight Sources and Shadows

OING FURTHER



132-133

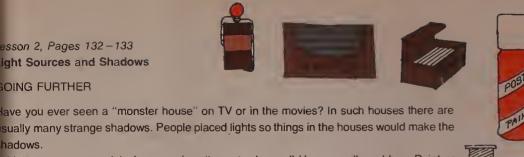
### MATERIALS (GOING FURTHER)

Boxes, shoe, or other cardboard boxes Crayons or paints Electric light sources from p. 131 Glue or paste

Sticks or toothpicks Thread, black

#### 1 HOUR SMALL GROUPS

Keen the childrens' attention tilic aspects of the project. Several "monster rooms could later be put together to make a big display monster house 'Perhaps you can plan this project around your Hallow



hadows. Make your own model of a room in a "monster house." Use a cardboard box. Paint or rayon the walls, floor, and ceiling. Paint the room so the shadows will look scary. Make urniture out of cardboard and sticks or toothpicks. Make spider webs out of black thread Perhaps add a "monster doll" to the room. Set your light source wherever it will make the cariest shadows.



single page



137

## MATERIALS

\*Bulbs, household \*Electric light sources from

p. 131

\*Light sockets
\*Shadow testers from p. 136

(optional)
\*Items in Kit

# 30 MINUTES MEDIUM GROUPS

The flashlight bulb of the onecell light source should make sharper shadows than the larger household bulb.

The brightness of the larger household bulb affects the contrast between the shadow and its background, but not the sharpness.



Lesson 3, Page 137
Sharp and Fuzzy Shadows

Here are two light sources. Which do you predict will

make sharper shadows?

the flashlight bulb





Now make a fair test to see if your prediction is correct. The bottom pictures on page 137 of your text show one way to make a fair test.

In the first box, draw a picture of the shadow made by the small light source. In the second box, draw a picture of the shadow made by the large light source. Is your prediction correct? \_\_\_\_\_ (yes or no)

SHADOW MADE BY SMALL LIGHT SOURCE

SHADOW MADE BY LARGE LIGHT SOURCE

In a fair test, everything must be the same except for one thing. What things were the same in your test? the object, the distance from the light source to the object, the distance from the object to the wal

or screen

What one thing was different in your test? \_\_\_\_\_\_

the size of the light source

## narp and Fuzzy Shadows

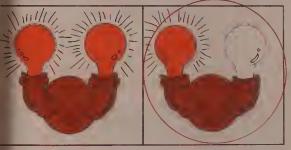
ook at the pairs of light sources shown on this page. See ow many of them you have in your home.

Observe and compare the shadows made by the light burces in as many pairs as you have. You may want to se your shadow tester to do this.

AFETY NOTE: Do not touch a lighted bulb or one that as been on recently. You could burn yourself.

Draw a circle around the picture of the light source in ach pair that makes the sharper shadow. Here are the airs of light sources:

- A lamp with two bulbs, both lit.
- The same lamp with only one bulb lit.

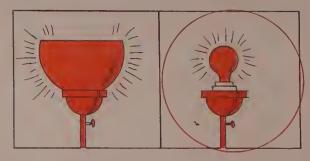


- A lamp that has a shade on it.
- · The same lamp without the shade.

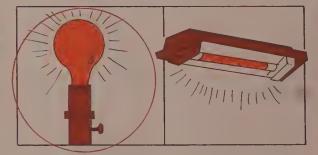




- · A lamp with a white glass bowl.
- The same lamp without the bowl.



- An ordinary electric light bulb.
- · A long, glass, electric light tube.



To compare these shadows fairly, what things must you keep the same? 
the object, the screen, the distance from the light source to the object, the distance from the object to the screen

STUDENT TEXT PAGE

139

#### MATERIALS

Fluorescent light (long tube) Lamp with two bulbs Lamp with shade Lamp with white glass bowl Shadow tester from p. 136 (optional)

#### 20 MINUTES INDIVIDUAL WORK

The more sources of light, the more diffuse the light becomes, and the less distinct is the shadow that is caused.

A fluorescent tube is lined with many tiny particles which glow, or fluoresce, when the light is on. Each becomes a separate light source.

After the children have performed the activity and have completed this page, discuss with them the last three questions on page 139 of the student text.

single page



## MATERIALS

\*Bags, plastic, food \*Containers, large and clear \*Flashlights or projectors

Hair

Oil (optional)

Paper, drawing Pencils

\*Straws, plastic \*Tumblers, clear

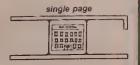
Water

\*Items in Kit

#### 25 MINUTES MEDIUM GROUPS

On a sunny day, students can use sunlight instead of a flashlight to do these activities.

If the students perform the optional activity, have them use one of the straws as a dropper. Demonstrate the procedure.



Lesson 4, Page 140 Dark and Light Shadows

Do the activities, as described on page 140 of your text. If an object casts a shadow, draw a picture of the shadow in the proper box. Show how dark the shadow is and whether it is sharp or fuzzy.

A plastic bag casts a

Clear plastic bog

A clear tumbler casts a

Clear tumbler

Ripples in water

Ripples in clear water cast

When the plastic bag is filled with air, the shape of the shadow differs. The shadow may be lighter.

Clear plastic bag filled with air

When the clear tumbler is filled with water, it casts a

Clear tumbler filled with water

A flowing hair casts a

Hair on water

When the plastic bag filled with scrap paper, shadow is darker.

Clear plastic bag

filled with scrap page

Air bubbles cast dark

' shadows than water.

Bubbles in water

The oil drop floats on ! water and casts a shado

SHADOWS AND LIGHT

Oil drop on wat (optional)

# Dark and Light Shadows

See if you can make a shadow lighter. First, make a dark shadow, as described on page 142 of your text. Then try these things.

1. Shine a flashlight into the shadow. Does this make the shadow lighter, or does this make the shadow disappear? Circle one:

## LIGHTER DISAPPEAR

2. Hold a mirror so it reflects light into the shadow.

Does this make the shadow lighter? \_\_\_\_\_\_\_ (yes or

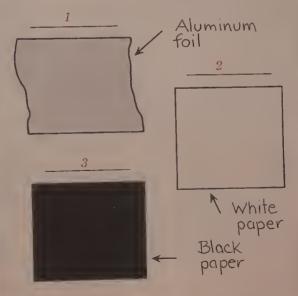
no) Can you make the place where the shadow falls brighter than it was before the shadow was there?

yes (yes or no) If so, how? Hold the mirror so that it reflects light from a second source toward the place where the shadow was.



3-4. Now do the third and fourth activities on page 142 of your text. Compare the amounts of light aluminum foil, white paper, and black paper reflect into the shadow. Order the materials from the one that reflects the most light to the one that reflects the least light.

Record the order. Write the numeral 1 above the picture of the material that reflects the most light into the shadow. Write the numeral 2 above the picture of the material that reflects the next most light. Write the numeral 3 above the picture of the material that reflects the least light.



STUDENT TEXT PAGE

142

#### MATERIALS

Blocks, wood Flashlights Foil, aluminum 25 cm x 25 cm Mirrors Paper, black Paper, drawing Projectors

#### 20 MINUTES SMALL GROUPS

In part 1 if the flashlight is bright enough, it will make the shadow disappear Otherwise, it will make the shadow lighter.

single page

GE SPACE

STUDENT TEXT

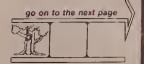
150



Chalk
Clocks or watches
Crayons
Poles or tall sticks

1½ HOURS
SMALL GROUPS

If the students cannot find a pole on the schoolyard that casts a shadow, hammer a long stick into the ground.



# 7 Sunlight on the Earth and Moon

Lesson 1, Page 150

Sunlight and Shadows

Go outdoors on a sunny day and observe the shadow of a pole, as described on page 150 of your text. You can record your observations on the opposite page. First, follow the directions below.

Let the dot on the opposite page show where the pole sticks into the ground. Draw in some of the things around the pole, such as a walk or fence. Then draw the following things on that page. Use a different color crayon for each.

Time shadow was first observed:

- 1. Draw the shadow as you first see
- it. Show the color you used here.

2. Show where you predict the shadow will be in 15 minutes.

Color used:

3. Show where the shadow really is after 15 minutes.

Color used:

What time was this?

4. Draw where you predict the shadow will be 30 minutes after you first observed it.

Color used:

5. Draw where you predict the shadow will be an hour after you first observed it.

Color used:

Draw where the shadow really
 minutes after you first observed

Color used:

What time was this?

Draw where the shadow really an hour after you first observed it

Color used:

What time was this?

SUNLIGHT ON THE EARTH AND MOON

Draw the shadows	as they appear v	vhen you are looking	directly down at them.	
			<u>.</u>	
		lo		
		pole		
at does the shadow do?		see margin note		
w might you explain this?		see margin note:	5	

**150** 

This activity can be carried further by repeating the same procedure the next day, one week later, and perhaps one month later if possible, leave the chalk marks from the earlier trials. The shadows will change because of seasonal changes in the angle of inclination of the earth's axis.

The pole's shadow moves. It turns around the pole in the same general direction (clockwise in the Northern Hemisphere) all day long.

Most children will explain the motion of the pole's shadow by saying that the sun moved. A few might say that the earth moved

last page

# STUDENT TEXT

155

## MATERIALS

- \*Cardboard, 20 cm × 20 cm
- \*Eyedroppers
- Pencils, sharp
- \*Pins, straight
- \*Rulers, metric \*Straws, plastic
- Scissors

...

Water

\*Items in Kit

# 20 MINUTES SMALL GROUPS

The more a child tilts the turning\_cardboard, the less the path of the water curves. When the child turns the cardboard in the opposite direction, the path of the water curves in the opposite direction. The faster the child turns the cardboard, the more the path of the water curves.

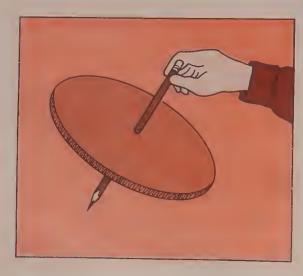


# Lesson 2, Page 155 The Moving Earth

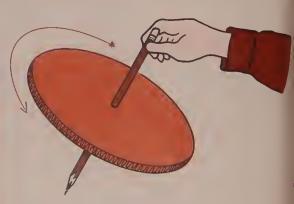
Make a circle out of cardboard, as described on page 155 of your text. Push a pencil through the center of the circle. Hold the pencil straight up and down.

Put several drops of water on the cardboard near the pencil. Without turning the cardboard, tilt it so the water runs down across it. What kind of path does the water make—straight or curved? \_\_\_\_\_\_\_straight

Try this a few times. On the picture below, draw the paths of several drops of water across the cardboard.



On the picture below, draw the paths of several drop of water across the cardboard. Add a curved arrow the show the direction you turned the cardboard.



Now try the second part of the activity in different ways as described on page 155 of your text. What do you observe? \_\_\_\_\_\_ see margin notes

As winds move across the earth, they make curved paths marked by swirls of clouds. What do these paths show?

The curved paths show that the earth must be turning.

(half hour later)

Observe the moon at different times, as described on page 157 of your text.

PREDICTIONS

OBSERVATIONS (first observation) TIME

ANOTHER HALF HOUR LATER (one hour after starting) HALF HOUR AFTER THAT (11/2 hours after starting)

In space 3, sketch where you predict the moon will be after another half hour. In space 4, sketch where you predict it will be a half hour after that.

(half hour later) TIME 6. (half hour after that) TIME Now check your predictions. In

5 OBSERVATIONS

Now check your predictions. In space 5, sketch the position of the moon a half hour after your last observation. In space 6, sketch its position a half hour after that.

STUDENT TEXT

157

#### MATERIALS

Clock or watch Pole Stone

# 1½ HOURS INDIVIDUAL WORK

Ask why the moon's position seems to be changing. You might help their reasoning by follow-up questions such as, "Is it because the moon itself is moving? Is it because the earth is turning?" etc.

Most of the apparent motion is due to the earth's rotation, but the moon too is moving in its orbit about the earth.

In the Northern Hemisphere, the moon appears to move to the right, like the sun. After a half hour, it is at least three-moon diameters to the right of the top of the pole. During the same time, the moon may move upward or downward in the sky

single page



Addison-Wesley | All rights reserved.

In space 1, sketch the moon when it

In space 2, sketch the moon and

the other object to show how they

look a half hour later. Be sure you

seems to touch the top of a tree.

TIME

159

## MATERIALS

- \*Balls, foam plastic
- "Balls, rubber, small
- \*Balls, table tennis
- \*Bulbs, household
- \*Light sockets
- \*Metre sticks
- \*String
- \*Tape, masking

\*Items in Kit

# 15 MINUTES MEDIUM GROUPS

When a ball is 1 m or more from the light, the half of the ball facing the light is lit by the light. The half of the ball turned away from the light is in its own shadow.

The amount of darkness and light does not change when a student turns the ball around.

single page



Lesson 3, Page 159

Day and Night

Fasten a ball to a piece of string. Darken the room. Holding the string, move the ball 1 m from a lighted electric bulb.

Observe how much of the ball is in light and how much is in shadow. Observe which part of the ball is in light and which part is in shadow. Record your observations on drawing 1 by darkening the part of the ball that is in shadow.

Do the rest of the activity, as described on page 15s of your text. Record your observations on drawings 2 and 3. Darken the part of the ball in each drawing that is in shadow.

What caused the shadow on each ball?

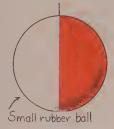
the ball itself

At all times, some part of the earth has nighttime because it is in shadow. What causes the shadow?

the earth

Drawing 1





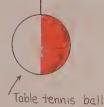






Drawing 2





Foam plastic ball

Lesson 3, Page 160

# Day and Night

Set up a globe in sunlight, as described in the first paragraph on page 160 of your text. The globe is a tiny model of the earth. How much of the model is in direct sunlight? Circle one:

HALF

LESS THAN HALF MORE THAN HALF

Is your home area on the model earth in direct sunlight? \_\_\_\_yes \_\_\_ (yes or no) Is your home area on the real earth in direct sunlight? \_\_\_\_\_\_ (yes or no)

What part of the model is in shadow? Circle one:

HALF

LESS THAN HALF MORE THAN HALF

Suppose you could see the real earth from far out in space. Would the same part of the real earth be in shadow, too? \_\_\_\_yes \_\_\_ (yes or no) Would it have daytime or nighttime? Circle one:

DAYTIME NIGHTTIME

Next, stick a little clay on your home area of the model earth. Make sure this area is still at the very top. Stand a toothpick straight up in the clay. Observe where its shadow falls.

Now, observe the shadows of upright posts on the real earth. Do their shadows point in the same direction as the toothpick's shadow? yes (ves or no)

When you turn the model earth, does the toothpick's shadow change? \_\_yes \_\_ (yes or no) Can you make your home area go from "day" to "night"? \_\_\_yes\_\_\_ (yes\_ or no) Can you make it have "sunrise" and "sunset"? <u>yes</u> (yes or no)



STUDENT TEXT PAGE

#### MATERIALS

Book Globe \*Clay, modeling \*Toothpick

## 30 MINUTES ENTIRE CLASS

\*Items in Kit

Once the North Pole is pointing due north, the globe should be turned and titted until your home area is facing directly up. The North Pole should still be pointing north but at an angle to the ground

When the globe is turned, the shadow of the too hoick swings around the toothpick, just as the shadow moved around the pole in the activity on page 150. The shadow also changes length. It is longest when the toothpick is near the edge of the area in shadow

single page



165



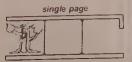
Clock or watch

# 30 MINUTES INDIVIDUAL WORK

This activity can be more effective if it is possible for you to meet with the class in the evening to observe the phenomenon of twilight. If this is not possible, the students can do it on their own.

Due to tall buildings, trees, or hills, the sun may disappear from sight before the time of "official" sunset. You might check the newspaper and announce to the class the time that the sun will set. Twilight starts at that time.

It takes about a half hour, more or less, to become too dark to read.



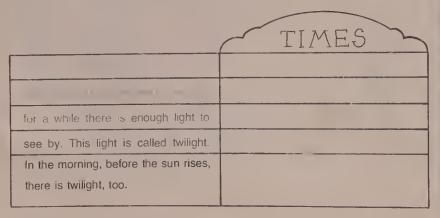


Lesson 4, Page 165
Light on the Earth

How long does it take to become really dark where you live? On a clear afternoon watch for the sun to set. Record the time at which the sun completely disappears from view.

SAFETY NOTE: Never look directly at the sun. Instead, look a little distance away from it until it is out of sight.

Then, see how long you are able to read outdoors using only light from the sky. Keep a record of the amount of time that passes between when you are able to read each of the lines below until you can no longer read any of the lines.





# lesson 5, Pages 166 - 167 Sunlight on the Moon

Which of the shapes shown on page 166 of your text does

look every day until you see the moon in the daytime.

the moon look like? \_\_\_\_1, 2, 3, 5, 7, 9, and 10

Stand in a sunny place. Hold up a ball. How much of the ball is in sunlight? Circle one:

HALF OF IT

LESS THAN HALF OF IT

MORE THAN HALF OF IT ALL OF IT

How much of the sunlit part can you see? Circle one:

HALF OF IT LESS THAN HALF OF IT

MORE THAN HALF OF IT ALL OF IT

Does the amount of the ball in sunlight change when you

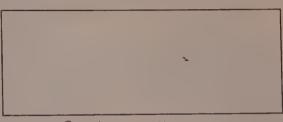
move the ball? <u>no</u> (yes or no)

Hold the ball so that it is directly between you and the moon. Look at the ball. Record what you see by drawing a shadow on the ball in the picture below. Make the sunlit part look like the sunlit part of the real ball.



Draw arrows on the picture showing the direction from the sun to the ball. Draw a moon on the picture. Make it look like the real moon.

Suppose the moon were in a different position in the sky. In the space below, draw a picture of what you predict it would look like.



Predicted Shape



# Observed Shape

Test your prediction by holding the ball toward the moon's new position. In the space above, draw a picture of the moon. Remember that it looks the same as the lighted part of the ball. Was your prediction right?

(ves or no)

SUNLIGHT ON THE EARTH AND MOON

STUDENT TEXT PAGES

166-167



\*Balls, white

\*Items in Kit

#### **45 MINUTES** SMALL GROUPS

Remind the children not to look directly at the sun as they search the sky for the moon.

see the moon during the school day are about a week before and a week after the new moon.

When a child holds the ball up in sunlight, the amount of its sunlit part that the child can see depends on the position of the ball and of the child.



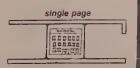
170-171

#### MATERIALS

Balls, foam plastic Bulbs, household Light sockets Pencils

# 30 MINUTES ENTIRE CLASS

Give each child an opportunity to hold a ball and to observe how the lighted part changes as the child turns around.



Lesson 5, Pages 170 171 Sunlight on the Moon Use a small ball as your model moon, as described on page 170 of your text.

1. Hold the model moon at eye level and move it to different positions. In what position must you hold it to see all of its lighted side? Circle one:

IN FRONT OF ME WHEN I AM FACING THE LIGHT

IN FRONT OF ME WHEN I HAVE MY BACK TO THE LIGHT

## OUT TO MY SIDE WHEN I AM FACING THE LIGHT

2. Slowly move the model moon around you in a circle. Hold it in front of you at eye level but try to keep it out of your shadow. If you begin by facing the light and turn halfway around, what happens to the lighted side of the model moon? Circle one:

SUNLIGHT ON THE EARTH AND MOON

I SEE MORE AND MORE OF THE LIGHTED PART

I SEE LESS AND LESS OF THE LIGHTED PART

I SEE THE SAME AMOUNT OF THE LIGHTED PART

Can you make the model moon seem to go from crescel to half to gibbous to full? yes (yes or no) Then cay you make it seem to go back to gibbous, half, and cres

cent? \_\_\_\_\_\_ (yes or no)

Hold up the model moon. Does the lighted part seem grow larger or smaller as you turn away from the sun

larger	As you turn toward the s	šŧ
	m = 11 =	

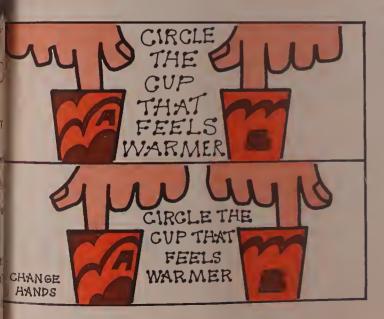
# **8 HEAT AND TEMPERATURE**

Lesson 1, Page 179

ne Way to Tell Temperature

. Fill two paper cups with water, as described on page 179 of your text. lave a partner dip a finger in the water in each cup, as shown in your ext. Ask your partner in which cup the water seems warmer. Record the nswer in your partner's *Experience and Record Book*.

Have your partner change hands and feel the water. In which cup does he water seem warmer? Record the answer in your partner's Experince and Record Book.



Now, you try. Can you tell in which cup the water is warmer and in which it is cooler? \_\_\_\_\_ (yes or no) On the drawings below, record how the water feels to you.

2. Set the cups on opposite sides of the room. Have your partner dip a finger in the water in one cup. Then, have your partner dip the same finger in the water in the other cup. Can your partner feel in which

cup the water is warmer? \_\_\_\_ (yes or no)

Now, you try. Can you tell in which cup the water is warmer? \_\_\_\_\_ (yes or no)

Is it easy to remember how warm something feels while you move away from it?

 $\underline{no}$  (yes or no)

How long can you remember how warm or cold something feels?

only a short time

STUDENT TEXT

179

### MATERIALS

\*Cups, paper Pens, felt-lip Water, cool Water, hot \*Items in Kit

# 30 MINUTES SMALL GROUPS

The temperature difference between the water in the two cups should be such that students find it fairly easy to tell the hot water and the cool water apart when the cups are side by side

A finger does not "remember" a Temperature well. Also, evaporation of water from the wet Tinger cools the finger while the student walks across the room. And so the finger tends to "judge" the water in the second cup to be warmer than it actually is.

If larger containers (canning jars, etc.) are available, use them inslead of the paper cups. The larger amounts of water will hold their temperature longer

single page



STUDENT TEXT

180



\*Bubble-blowing liquid

'Bowls, small

'Cans, metal, small

Water, warm

\*Items in Kit

30 MINUTES
SMALL GROUPS

The tilm bulging upward shows that the air inside the can is expanding as it warms up. If the water in the bowl is very deep, the can may tloat. If it does, have a child hold the can on the bottom of the bowl.

MATERIALS (GOING FURTHER)

Ice cubes

30 MINUTES
SMALL GROUPS

The film bulging downwaro shows that the air inside the can is contracting as it cools

single page



Lesson 2, Page 180

**Observing Temperature Changes** 

Dip the opening of a small can in some bubble-blowing liquid or detergent. Turn the can upright. On the picture of the can at the right, draw the film that covers the opening. Make it look as it does when you first take the can from the liquid.

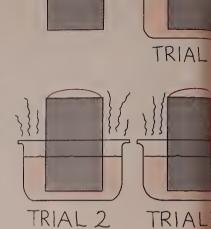
Warm the can, as described in the activity on page 180. Draw the film on the picture of the can (Trial 1). Make it look as it does after the can has been sitting in warm water.

When the film breaks, let the can cool. Then, do the activity at least two more times. Record what the film looks like in trials 2 and 3 after the can has been sitting in warm water. Are your observations the same each time?

\_ (yes or no)

What do you think happens to the air inside the can as its warms?

It "gets larger" (expands).



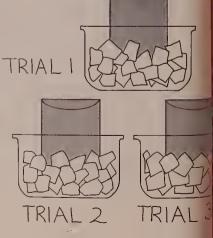
## GOING FURTHER

Make a film over the opening of a small can, as you did in the activity on page 180. Set the can in a bowl of ice cubes. Observe the film. Record what it looks like after the air in the can cools (Trial 1).

Do the activity two more times. Each time record what the film looks like after the air in the can cools (Trials 2 & 3).

What do you think happens to the air in the can as it cools? \_\_\_\_\_\_\_

It "gets smaller" (contracts).

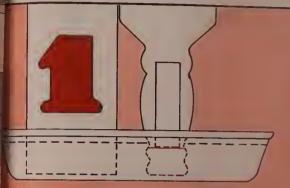


HEAT AND TEMPERATURE

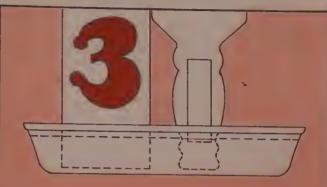
# Lesson 2, Page 181

# **Observing Temperature Changes**

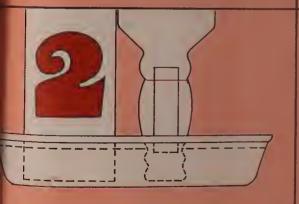
Find a bottle with a long narrow neck. With others to help, warm the bottle with your hands. Set it upside down, as described on page 181 of your text.



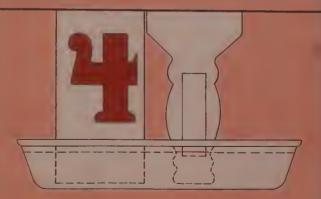
In drawing #1 show the level of the water in the bottle when the bottle with warmed air is first placed in the pan of water.



Suppose you warm the air in the bottle again. Predict what will happen to the level of the water. Record your prediction on the bottle in drawing 3.



In drawing #2 show the level of the water after air in the bottle cools.



After you have warmed the air in the bottle again, show the level of the water on the bottle in drawing 4.

HEAT AND TEMPERATURE

STUDENT TEXT

181

#### MATERIALS

Blocks, wood, or weighted milk cartons Bottles, narrow necks

Food coloring
Pans or saucers
Tape, masking
Water

#### 45 MINUTES LARGE GROUPS

You may wish to review some of the things learned about air pressure. Air pushes down on the water in the pan and holds up the column of water in the neck of the bottle.

To rewarm the bottle after the water has entered its neck, place the pan with the bottle (and block) in the sun.

In this activity, the students set up an air thermometer. When they complete the activity, you may wish to have them calibrate the air thermometer, as directed on page 182 of the student text.



#### **MATERIALS**

Candles

Chairs

Lids, jar

Mass

Matches

String

Wire, aluminum (from an aluminum screen)

Wire, copper, bare. #18 - #22 Wire, iron, picture

#### 20 MINUTES **ENTIRE CLASS**

This activity works better with several candles or two cans of Sterno, moved back and forth along the wire, one on each side of the mass.

#### MATERIALS (GOING FURTHER)

Hammer

Hooks, cup

Nail, small, or straight pin

Nails

Pointer, classroom

Rubber bands

Rulers, metric

Wood, scrap

## 20 MINUTES **ENTIRE CLASS**

single page



Lesson 2, Page 184

# **Observing Temperature Changes**

Do solids expand and contract when their temperature changes? Your class can find out by doing the activity on page 184 of your text.

What happens when the wire becomes warm? Circle the sketch at the right that shows what happens.

What do you think will happen when the wire cools? Mark an X over the sketch that shows your prediction.

Was your prediction right? Circle one:

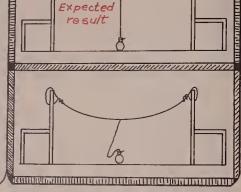






Try this with another kind of wire. Use iron wire, such as picture wire, or wire from an aluminum screen. Are the

results the same? \_\_\_\_ (yes or no)



AUDIOLOGICA DE LA CONTRACTORIO D

## GOING FURTHER

Make a wooden stand like this with a moveable arm made of a chalkboard pointer. Use a tiny nail or a pin to hold the bottom of the arm in a small nailhole.

Measure the distance from the tip of the arm to the table top. Then ask your teacher to hold a lighted candle and move the flame up and down right next to the rubber bands to heat them. What happens to the pointer as the rubber bands

	7, ,
arm?	It moves downward

Do rubber and copper wire act the same way when heated? yes or no)

SAFETY NOTE: Do not do these activities unless there is an adult present.

rubber bands

candle moved up

and down next

to rubber bands

small nail-

pin

hole 1

measure before and after HEAT AND TEMPERATURE



Lesson 3, Page 186

# Thermometers

What kind of bottle shape makes the best thermometer? Test two kinds of bottles, as directed on page 186 of your text. Place a strip of tape on each bottle from the top down and mark your water levels on this strip.

On the strips on the bottle drawings, copy the marks you made on the real strips. Label your marks 1, 2, and 3 to show the water levels.

- 1. at the start
- 2. after cooling
- 3. after warming In which bottle are the marks farther apart?

In which bottle did the water level change more?

Why did it change more in that oottle?

What shape of container would you look for to make a thermometer?

STUDENT TEXT PAGE

186

#### MATERIALS

Bottles, narrow necks Bottles, wide necks Food coloring Pens, felt-tip Refrigerator Tape, masking Water

### 4 HOURS MEDIUM GROUPS

Try to get bottles with the same capacity but with necks of very different diameters.

Water expands when heated and contracts when cooled. If the capacilies of the two bottles are about the same the expanded volume of water will also be about the same, but will move further along the neck of the narrow-necked bottle.

single page



STUDENT TEXT

189



\*Cups, foam plastic Ice cubes \*Salt, table

'Thermometers, Celsius

Water, hot

\*Items in Kit

# 45 MINUTES SMALL GROUPS

Some freezers cool ice below the treezing point of pure water, 0°C. Nevertheless, a mixture of ice and pure water atways has a temperature of 0°C As the ice melts, the temperature of the mixture remains at 0°C until all of the ice has melted. Then the temperature of the mixture starts to rise to room temperaturo.

Salt lowers the freezing point of pure water. When salt is added to ice, the temperature of the resulting mixture of ice and salt water is below 0°C.

single page

 T	
H H H H H H	
स्थाक <u>तिस्</u> स्थाकतम्	

Lesson 3, Page 189
Thermometers

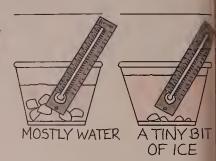
Do part 1 of the activity on page 189 of your text. Record the temperature as you take it on each drawing below. How do these temperatures compare?

TEMPERATURE

OF ICE & WATER:







TEMPERATURE WITH SALT:

2. Do part 2 of the activity on page 189. Take and record the temperature as the ice cubes melt	How
does it compare with the temperature of only ice and water?	What is the low-
est temperature you can get with an ice-and-salt mixture?	e,
3. Fill an insulated cup with hot water from the tap. Estimate and record its temperature	Measure
and record its temperature How does the temperature compare with your estimate	te?
4. Estimate and record the temperature of your classroom Measure and record	l its temperature.

Estimate and record the temperature outdoors. \_\_\_\_\_ Measure and record the temperature outdoors.

HEAT AND TEMPERATURE

How good was your estimate? \_

How good was your estimate?

## Lesson 4, Pages 192-193

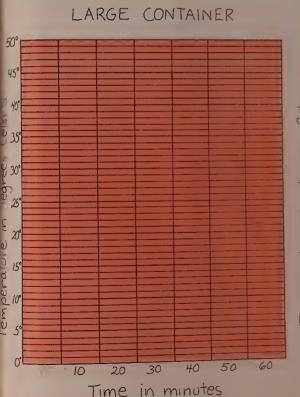
# Temperatures of Large and Small Things

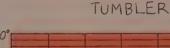
As you do the activity on pages 192 and 193 of your text, record the temperatures on the grids below. The grids on page 191 of your text show you how to record the temperatures. Answer the questions on page 192 within your group.

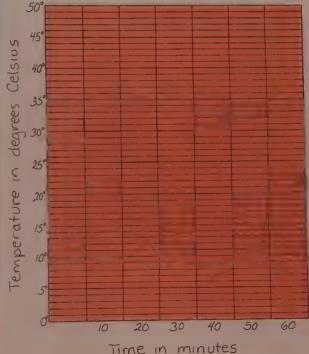
Which warmed up faster, a small sample of water or a large amount? \_\_\_\_\_

a small sample

Use your graphs to answer this question.







STUDENT TEXT PAGES

192-193

#### MATERIALS

\*Containers, large, or aquariums

Crayons, two colors

\*Thermometers, Celsius

\*Tumbiers or small cans Water, cold

\*Items in Kit

# 1 TO 2 HOURS MEDIUM GROUPS

It is desirable that the two containers be made of the same material so they will conduct heat at the same rate.

Check to see whether the students understand how to graph the temperatures. (See page 191 of the student text.)

go on to the next page

HEAT AND TEMPERATURE

STUDENT TEXT

192-193

MATERIALS (GOING FURTHER)

Water, hot

1 TO 2 HOURS MEDIUM GROUPS

Cool the hot water if necessary so its temperature does not exceed 50°C.

last page

## GOING FURTHER

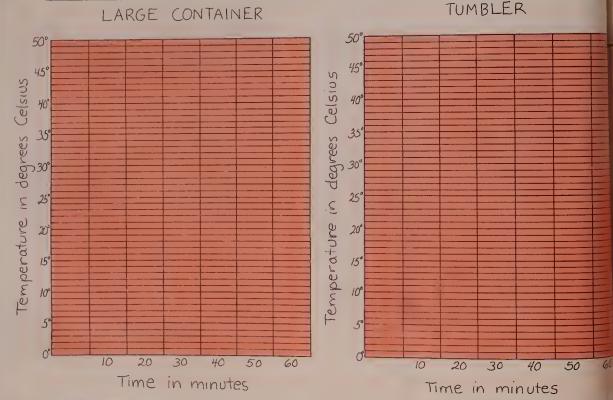
Suppose you did the experiment on pages 192 and 193 of your text with hot water. What do you predict would

happen to the temperature of the water in each container?

The temperature will change faster in the tumbler than in the large container.

Try the experiment with hot water from the tap. Record the temperatures on the grids below as you did for cold

water. How close are the results to your prediction?





Lesson 5, Page 197 Speeding and Slowing **Temperature Changes** 

Look at the list of objects on page 197 of your text. Which of the objects would you predict to be the best con-

ductors of heat? \_\_\_

see margin notes

The best insulators?\_

see margin notes

Test them to find out. Follow the directions in your text. Show your results by placing the letters of the objects on the chart below. Place them in order from best conductor to best insulator.

A-Iron nail; B-Small stick; C-Plastic straw; D-Piece

of copper wire; E-Rubber band; F-Metal spoon; G-Microscope slide.

How good were your predictions? Circle one:







Trial 4 Trial 2 Trial 3 Trial 1

HEAT AND TEMPERATURE

STUDENT TEXT PAGE

### MATERIALS

\*Bowls, insulated or soup \*Microscope slides

'Nails, Iron

\*Rubber bands

Spoons, metal

\*Sticks, applicator

\*Straws, plastic

Water, very hot

\*Wire, copper, bare, #18-#22

\*Items in Kit

### 30 MINUTES SMALL GROUPS

The water should be as hot as you can get it. Warn your students not to put their tingers in

iect into the water about the the water.

The copper wire, the spoon, and the nail are the best conductors of heat. The other

single page

204-205

MATERIALS

None

30 MINUTES INDIVIDUAL WORK AND **ENTIRE CLASS** 

A class discussion should follow this activity to allow pupils to clarify their reasons for the judgments they have made.

There is no one correct answer for any organism on the chart. But do not reveal this to the children. Let them reach this conclusion on their own during the discussion.

Il is a good idea to keep this page until after this chapter has been completed. At that time have the children reexamine their answers and ask them whether they now wish to change any

single page
E D D D D D

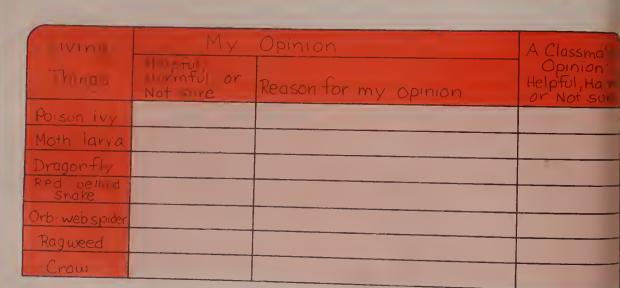
# 9 It All Depends

Introduction, Pages 204 - 205

Helpful or Harmful

Are the living things listed on the chart below helpful or harmful? Fill in your opinion after each one. Try to give a reason for your opinion. Fill in a classmate's opinion, too.

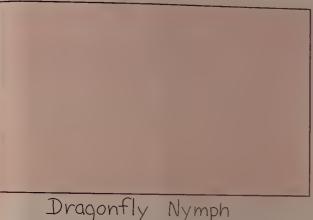
NAME OF CLASSMATE:



When you have finished, check your list with a cassmate's list. On which organisms do
you agree?
On which do you disagree?

# Lesson 1, Page 206 Helpful or Harmful

Do the activity with a dragonfly nymph, as described on page 206 of your text. Keep a record of the dragonfly nymph. Draw what it looks like in the space below. Fill in the blanks.



Place I found the dragonfly nymph: \_\_\_\_\_ Date I found the dragonfly nymph: Food the dragonfly nymph ate: \_\_\_\_\_ Date the dragonfly nymph became an adult:

# Dragonfly Nymph

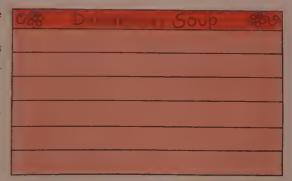
Lesson 1, Page 208 Helpful or Harmful

On the recipe card, list all the things you used to make dandelion soup. Then tell how you made it.

Eat the soup as soon as it is cool enough. How does it compare with other soups you have eaten?\_\_\_\_\_

Are dandelions helpful in this way? \_\_\_\_ (yes or no)

SAFETY NOTE: Make certain that the dandelions from which you collect the buds have not been sprayed with herbicide or pesticide.



STUDENT TEXT PAGE

### MATERIALS

Containers with lids Dragonfly nymphs

insects or worms

Pans, pie

Stones or blocks of wood

Strainers

Water, pond

### 1 2 HOURS MEDIUM GROUPS

As it grows, a dragonfly numph sheds its skin from time to

> STUDENT TEXT PAGE

#### **MATERIALS**

Bowls and spoons

Cup

Dandelion buds Pan, cooking

Salt

Sink

Stove or hot plate

# **ENTIRE CLASS**

single page



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IT ALL DEPENDS

### MATERIALS

- Boxes, cardboard, with lids
- \*Cups, paper
- Paper towels \*Seeds, bean
- \*Soil, garden or potting
- \*Tape, masking

Water

\*Wax paper

\*Items in Kit

#### 2 WEEKS MEDIUM GROUPS

Have the students set four or five of the cups in a circle under the hole in the lid Have them place the other cups outside the circle of cups.

All the plants grow toward the opening in the lid. In their competition for light, some of the outer plants may die.

Due to differences in the seeds, the plants may not grow equally well at first. After several days, the plants closer to the light grow better than those farther from the light.

single page



Lesson 2, Page 215

**Living Things Compete** 

To observe one way that plants compete, do the activity described on page 215 of your text. On the chart below, keep a record of the growth of the plants for two weeks.

Weel 1			Week 2		
Davs	3 Juth o D'arts	Days	Growth of Plants		
1		6			
2		7			
3		8			
		a			
<i></i>		1	· .		
0		10	it.		

Use your chart to answer these questions.

1.	Do the	plants	grow	equally	well	at	first?	<u>no</u>	(yes	or	no
----	--------	--------	------	---------	------	----	--------	-----------	------	----	----

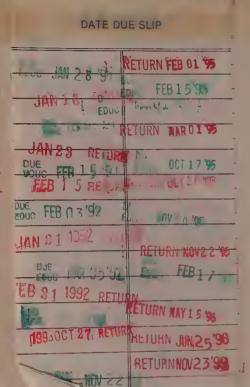
2. After several days, what difference is there in the	he plants? _
--	--------------

The plants closer to the ught grow better.

3. What seems to be causing the difference? \_

The amount of light the plants receive causes the difference in their growth.

IT ALL DEPENDS



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